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Innovations In Recreation Management: Importance, Diffusion, And Implementation

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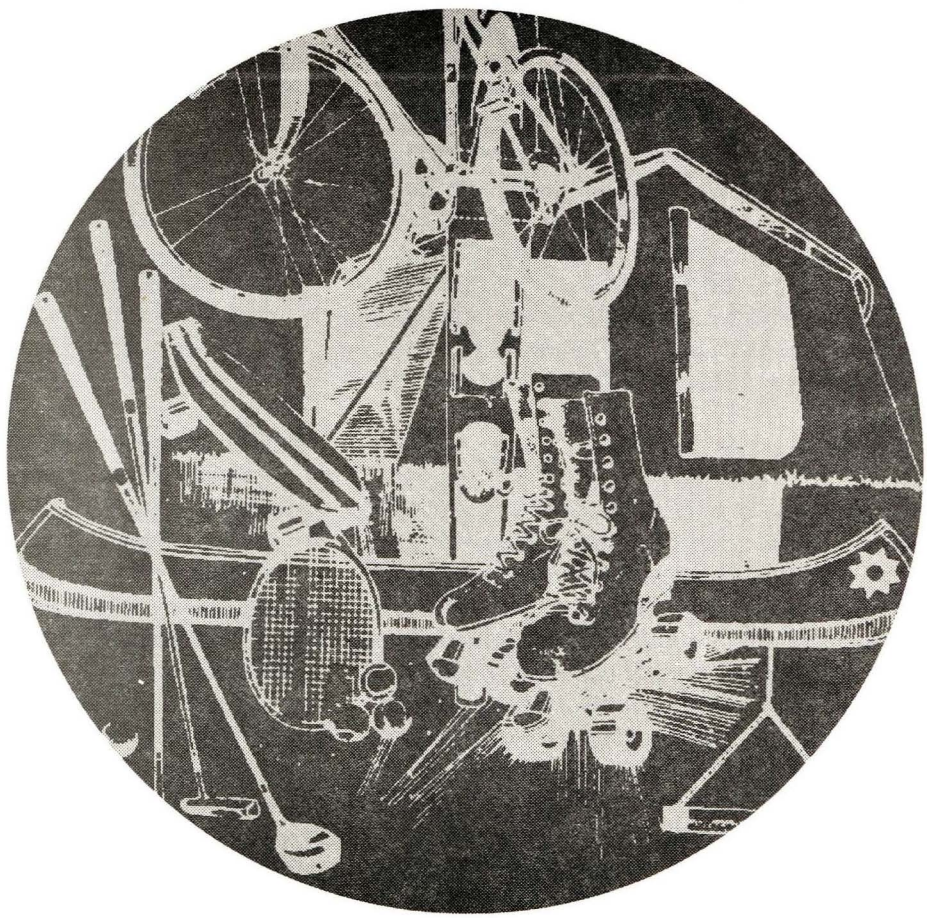

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Innovations in Recreation Management: Importance, Diffusion, and Implementation

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In the mid-1970's it was observed that research on innovation had become "possibly the most fashionable of all social science areas" (Downs and Mohr 1976). And, indeed, over the past several decades, innovation research has generated a huge body of literature, reaching into fields as diverse as anthropology, geography, physical health, and medical sociology.

Recreation resource management can boast of many innovations. Various Federal agencies, such as the USDA Forest Service and the USDI National Park Service, employ researchers who strive to improve recreation management by developing new management tools and techniques. In addition, cooperative agreements between government agencies and universities or private organizations contribute to innovation development. We devote many financial and human resources to improving recreation resource management.

Although researchers have devoted great effort to developing recreation management innovations, there have been few evaluations of these innovations or studies of their diffusion or implementation. Past research has focused on the diffusion of particular recreation management innovations (Dennis and Dennis 1990) and information transfer processes (Anderson and Morck 1986). Our study differs from earlier ones in that we seek to (1) identify important recreation resource management innovations, (2) determine their relative importance in meeting recreation management objectives, and (3) gather information about their diffusion and implementation.

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There are numerous benefits from this type of research. By understanding how managers perceive the importance of past innovations, where they learned about those innovations, and how they implemented them, we may better target areas for innovation diffusion. Examining innovations may also identify deficits in current technology and therefore provide direction and justification for additional research.

Perhaps most importantly this study provides support and justification for the expenditure of resources on recreation resource management research. Results can indicate that innovations are important both in a general sense and in accomplishing specific recreation management goals. The importance of the innovations suggests the need for their continued development. In times of diminishing budgets and research dollars, such justification is essential.

METHODS

We used a modified Delphi process to produce a list of research-based recreation innovations and determine their importance in meeting various management goals. Originally developed from a study by the Rand Corporation, the Delphi process uses a series of mailed questionnaires to "aggregate the judgments and opinions from a selected group of experts who are knowledgeable about the issue under study" (Ewert 1990). The Delphi is an efficient, reliable, valid, and popular tool for collecting information for natural resource studies (Baughman 1989).

In our study, we sent three rounds of questionnaires to 170 recreation resource managers and researchers. Recreation managers were selected from the USDA Forest Service Organizational Directory (USDA Forest Service 1990). Because of organizational shifts and position

vacancies, those in a variety of positions received the survey. Colleagues within the academic community helped identify recreation management researchers.

First Round—Delphi

The first round consisted of a simple open-ended questionnaire that asked participants to identify important recreation research-based innovations from the past 20 years. The questionnaire asked,

> "In your opinion, what are the most important recreation research based innovations in recreation management in the last twenty years?".

In November 1990, we mailed questionnaires to 146 recreation managers and 24 recreation research professionals. Followup letters were sent in December 1990. Subsequent followup calls were placed in January 1991. Eventually, 108 questionnaires (63.5 percent) were returned.

We used Advance Revelations (AREV), a software package designed to ease interpretation and analysis of long text files, to analyze data from this phase of the Delphi. We typed participants' lists of innovations verbatim into AREV's data base manager. From this extensive list, 26 keywords were identified and used to group similar ideas and concepts. A list of 21 innovation categories emerged from this data set.

Second Round—Delphi

In the second round of the Delphi, we listed the 10 innovation categories most frequently mentioned in the first round of responses and asked participants to rate the relative importance of the innovations with respect to three specific management goals: (1) improving the quality of recreation opportunities, (2) increasing the efficiency of providing recreation opportunities, and (3) decreasing environmental impacts. We asked participants to use magnitude scaling to indicate their perceptions of importance. Magnitude scaling is "simply a method of measuring the subjective, or perceived, magnitudes of real variables" (Welch 1972). Unlike traditional Likert scaling, magnitude scaling has an open response scale that allows respondents to express judgments as precise as possible; also proportional, ratio-preserving measures of opinion strength are produced (Lodge 1981).

The second-round questionnaire was mailed to the same 170 participants in March 1991. Followup letters were sent in April and May 1991. The level of response increased to 77.1 percent.

We standardized ratings of the relative importance of the innovations using the geometric mean. Geometric means are useful for ranking and comparing scores among participants. Standard deviation and range of scores were calculated to support the reliability of the data. In addition to the average ranking, we also looked at the percent of respondents ranking an innovation as most important for achieving a management objective and the percent ranking the innovation as the least important.

Third Round—Delphi

In the third round, we asked only the recreation managers to focus on the three innovations most often mentioned in the first round of the Delphi. For these innovations we asked managers to indicate whether they use (or have used) the innovation (the level of implementation) and how or where they learned of the innovation (the innovation diffusion point). We examined only the three most often mentioned innovations to lessen the information burden on participants and to ensure their familiarity with the innovations. Background questions asked for working job title, years in that position, and the type of recreation area managed.

In July 1991 we mailed third-round questionnaires to 146 recreation managers. Additional followup occurred in July and August 1991. The response rate was 78.1 percent.

The third questionnaire relied on general statistical analysis for interpretation. We used

the Statistical Package for the Social Sciences (SPSS) to generate frequencies. These frequencies produce reliable information on innovation diffusion points and implementation and general information on participants.

FINDINGS

Background Information

The sample consisted of 24 prominent recreation resource management researchers from 17 major universities, the Forest Service, and the Bureau of Land Management; and 146 recreation resource managers from the National Forest System of the Forest Service. Most recreation managers participating in this study have held their current position less than 6 years. One-fourth of managers have been at their job 6 to 10 years, and less than 10 percent have worked at their current position over 10 years.

More than 50 percent of our recreation manager participants manage day use areas (for example, picnic areas and/or boat launches), with 41 percent having overnight use areas (campsites with no separate picnic or other day use facilities). Those areas with overnight use have an average stay of 2.72 days, with the majority of visits less than 2 days. More than 89 percent of managers limit use in their area, and over 50 percent require permits.

Identifying Innovations

Respondents generated many pages of important innovations in response to the first questionnaire. Twenty-one innovation categories resulted from data analysis (table 1).

"Methods to manage for diversity" was cited most frequently as an important innovation in recreation management; 40 percent of respondents identified this innovation category as important. Twenty-nine percent of the participants identified "ways to determine limits of acceptable change" as an important innovation and almost one-quarter identified "techniques to promote better visitor information and education" as an important innovation. More than one-fifth of respondents identified "techniques to measure visitor behavior, attitudes, and perceptions" as important. There was little consensus among respondents on the remaining innovations.

Importance of Innovations in Meeting Management Goals

The second questionnaire sought consensus among respondents on the relative importance of the top 10 innovation categories. Respondents were asked to use magnitude scaling to indicate the relative importance of innovations to three management goals: (1) improving the quality of recreation experiences, (2) increasing efficiency of providing recreation opportunities, and (3) decreasing environmental impacts. Although all of these innovation categories are considered important for recreation resource management, their relative importance varies with specific management goals.

The ranking of the innovations by management goal, as determined by geometric mean, is shown in table 2. "Techniques to promote better visitor information and education" ranked first in improving the quality of recreation experiences and increasing efficiency of providing recreation opportunities. The most important innovation for decreasing environmental impacts was "methods to decrease resource degradation." In general, innovations that ranked high for decreasing environmental impacts ranked low in meeting the other two management goals.

Figures 1-3 show the percent of respondents identifying an innovation as the most important or least important in achieving a management goal. For each management goal, the ranking of the innovations changed little from that found using the geometric mean.

Comparing Responses of Researchers and Managers

Managers and researchers, for the most part, work independently on developing and implementing recreation management innovations. This isolation may have led the two groups to

Table 1.—*Percentage of respondents listing each innovation category in the first round of the Delphi exercise (n=108)*

Innovation category	Percentage of respondents
Methods to manage for diversity such as the Recreation Opportunity Spectrum (ROS)	40.0
Ways to determine limits of acceptable change (LAC)	29.0
Techniques to promote better visitor information and education	24.1
Techniques to measure visitor behavior, attitudes, and perceptions	20.1
Techniques to manage visual resources such as the visual management system (VMS)	16.0
Computer techniques for visitor management (MISTIX, PARVS)	13.9
Methods and processes to involve the public in resource decisions	13.9
Methods to decrease resource degradation (site hardening, etc.)	13.9
Techniques to monitor social and physical resource conditions	13.1
Techniques to manage visitors directly and indirectly (fees, permits, zoning, and others)	13.0
Methods to estimate social carrying capacity	11.1
Training packages offered through correspondence and/or short courses	11.1
Computer simulation models for recreation management and planning activities	11.1
Computer aided data storage and retrieval systems	8.3
Methods to improve visitor satisfaction	7.4
Techniques to provide accessibility and barrier free recreation opportunities	7.4
Methods to more effectively communicate with the public to provide quality services	6.5
Techniques to identify non-consumptive, wildlife-related recreation interests	5.0
Techniques to measure public opinion	3.7
Conflict resolution studies for dealing with conflicts between competing users	2.8
Legislation and legislative programs aimed at recreation resource management	1.9

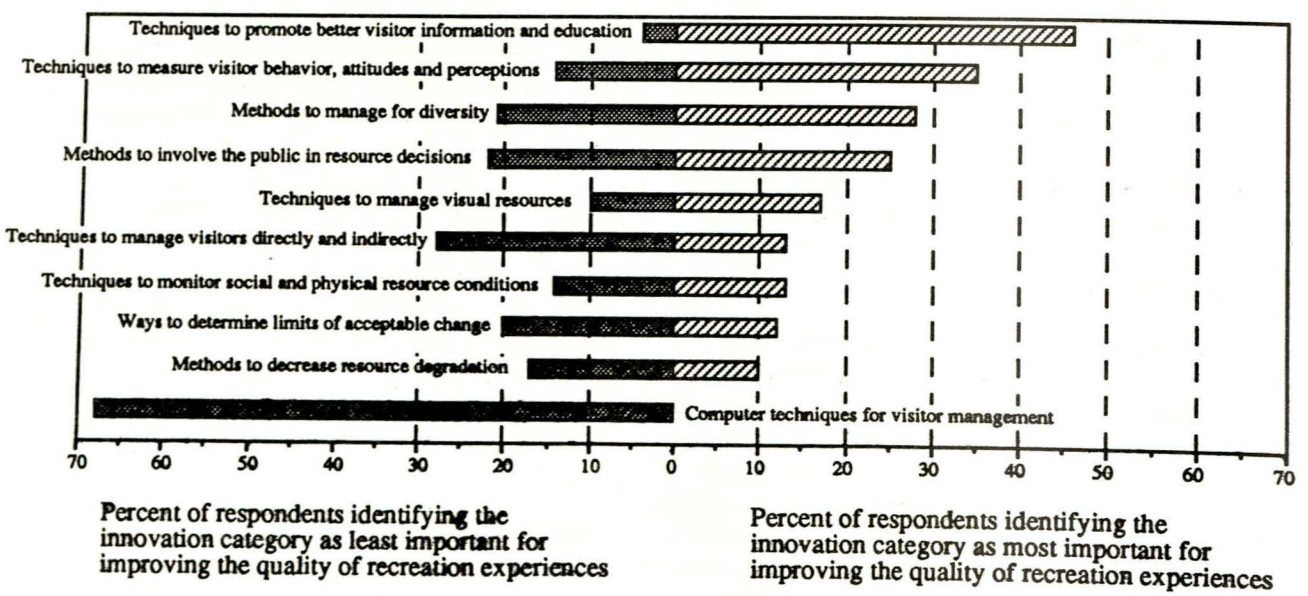

Techniques to promote better visitor information and education
Techniques to measure visitor behavior, attitudes and perceptions
Methods to manage for diversity
Methods to involve the public in resource decisions
Techniques to manage visual resources
Techniques to manage visitors directly and indirectly
Techniques to monitor social and physical resource conditions
Ways to determine limits of acceptable change
Methods to decrease resource degradation
Computer techniques for visitor management
70 60 50 40 30 20 10 0 10 20 30 40 50 60 70
Percent of respondents identifying the innovation category as least important for improving the quality of recreation experiences
Percent of respondents identifying the innovation category as most important for improving the quality of recreation experiences

Figure 1.—*Percent of respondents identifying an innovation category as the most important or least important for improving the quality of recreation experiences.*

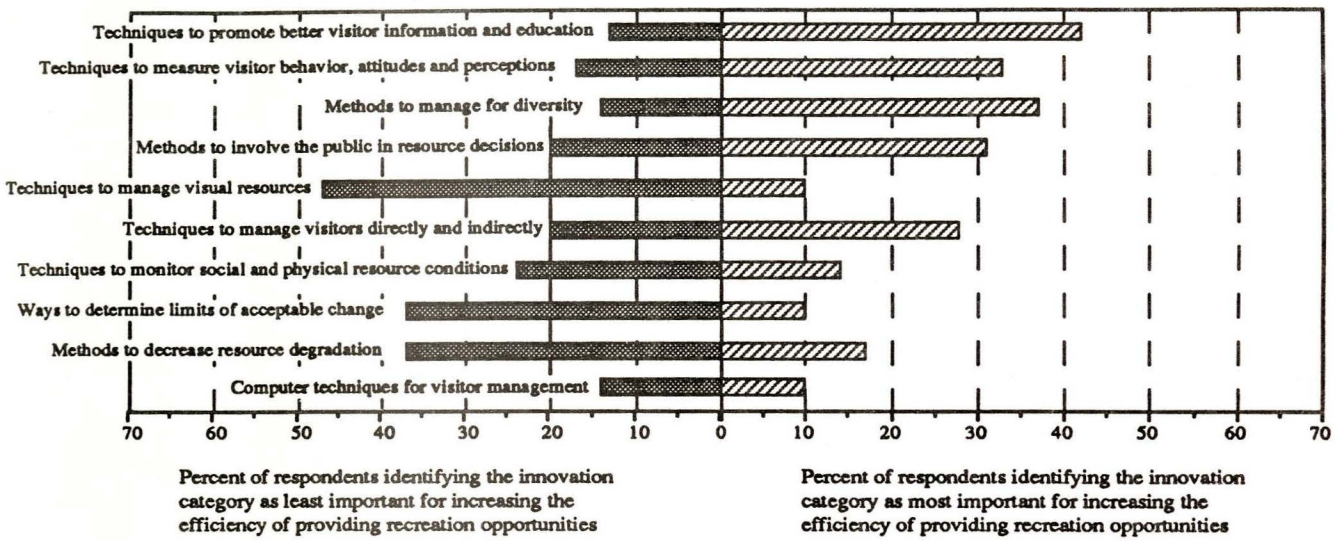
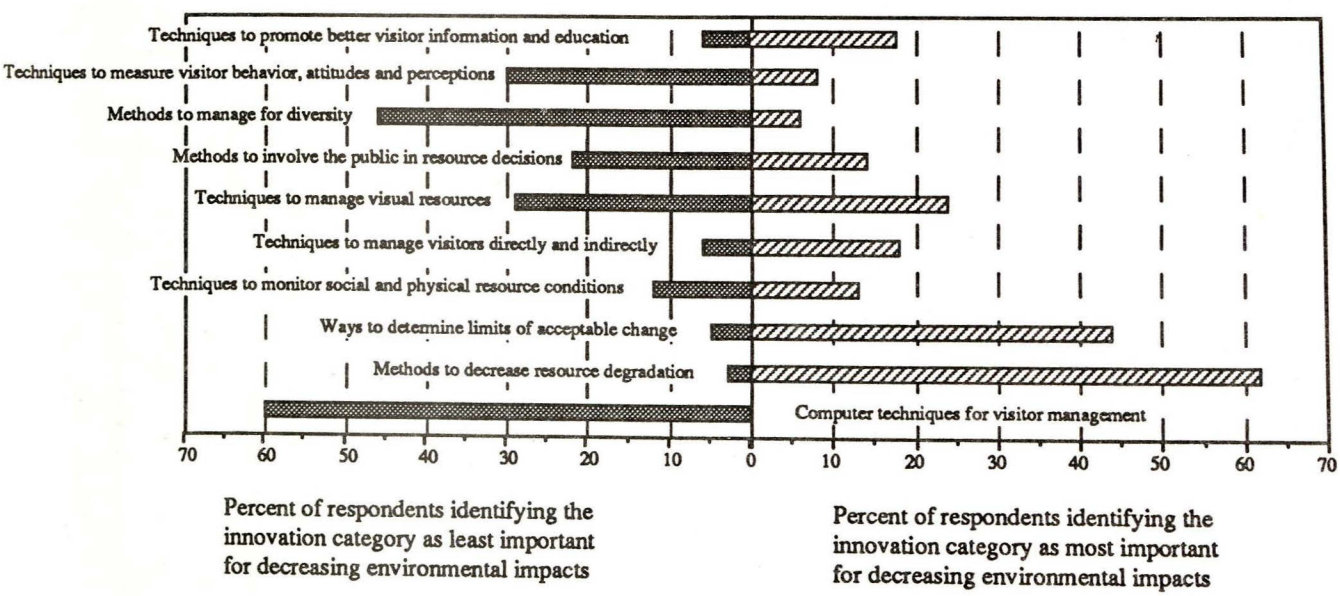

Techniques to promote better visitor information and education
Techniques to measure visitor behavior, attitudes and perceptions
Methods to manage for diversity
Methods to involve the public in resource decisions
Techniques to manage visual resources
Techniques to manage visitors directly and indirectly
Techniques to monitor social and physical resource conditions
Ways to determine limits of acceptable change
Methods to decrease resource degradation
Computer techniques for visitor management
70 60 50 40 30 20 10 0 10 20 30 40 50 60 70
Percent of respondents identifying the innovation category as least important for increasing the efficiency of providing recreation opportunities
Percent of respondents identifying the innovation category as most important for increasing the efficiency of providing recreation opportunities

Figure 2.—*Percent of respondents identifying an innovation category as the most important or least important for increasing the efficiency of providing recreation opportunities.*


Techniques to promote better visitor information and education
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Techniques to manage visual resources
Techniques to manage visitors directly and indirectly
Techniques to monitor social and physical resource conditions
Ways to determine limits of acceptable change
Methods to decrease resource degradation
Computer techniques for visitor management
70 60 50 40 30 20 10 0 10 20 30 40 50 60 70
Percent of respondents identifying the innovation category as least important for decreasing environmental impacts
Percent of respondents identifying the innovation category as most important for decreasing environmental impacts

Figure 3.—*Percent of respondents identifying an innovation category as the most important or least important for decreasing environmental impacts.*

Table 2.—Innovations ranked by relative importance in meeting three recreation management objectives (n=131)

Innovation category	Recreation management goal: Improving quality of recreation experiences		Increasing efficiency of providing recreation opportunities		Decreasing environmental impacts	
	Rank	Geometric mean	Rank	Geometric mean	Rank	Geometric mean
Techniques to promote better visitor information and education	1	1.943	1	1.944	3	1.932
Techniques to measure visitor behavior, attitudes, and perceptions	2	1.903	2	1.905	9	1.484
Methods to involve the public in resource decisions	3	1.894	5.5	1.861	7	1.789
Techniques to manage visual resources (e.g. VMS)	4	1.859	10	1.480	6	1.819
Methods to manage for diversity (e.g. ROS)	5	1.858	4	1.869	10	1.454
Techniques to monitor social and physical resource conditions	6	1.854	9	1.547	4	1.898
Methods to decrease resource degradation (e.g. site hardening)	7	1.834	7	1.824	1	1.966
Ways to determine limits of acceptable change (e.g. LAC)	8	1.819	8	1.793	2	1.950
Computer techniques for visitor managment (e.g. MISTIX, PARVS)	9	1.714	5.5	1.861	8	1.714
Techniques to manage visitors directly and indirectly (fees, permits, etc.)	10	1.526	3	1.881	5	1.892

develop different perceptions of the importance of an innovation for meeting specific management goals. Therefore, we investigated potential differences in the perceptions of recreation managers and researchers. In separating the respective samples and comparing their rank orderings, we found only one statistically significant difference between managers and researchers. However, lesser discrepancies did exist. Generally managers and researchers disagreed the most about the relative importance of innovations for increasing the efficiency of providing recreation opportunities, and they agreed the most about innovations decreasing unwanted environmental impacts (table 3).

Innovation Diffusion Points and Implementation

The third questionnaire sought general information about managers' experience and specific management areas as well as information about the diffusion and implementation of the three most important innovation categories. A central problem of knowledge use studies is defining what is meant by "use" (Dunn 1986). "Use" in this survey was defined as partial to complete implementation.

The recreation opportunity spectrum (ROS)

The recreation opportunity spectrum (ROS) is used by 87.7 percent of participants (table 4). They most often use the ROS to provide support for management actions and to improve the quality of providing recreation opportunities (table 5). Participants not using ROS cite lack of trained staff as the main deterrent. More than half the participants learned about the ROS from training sessions.

The limits of acceptable change framework

Nearly 70 percent of participants use the limits of acceptable change (LAC) framework (table 4). LAC is used mainly for improving the quality of recreation opportunities, providing support for management actions, and decreasing environmental effects (table 5). Participants cited lack of trained staff as the primary reason for not using LAC. Most participants learned about LAC through training sessions.

Information on visitor attitudes, preferences, and behavior

Although all participants were familiar with ROS and LAC, more than 10 percent were unfamiliar with information on visitor attitudes, preferences, and behavior as a recreation research management innovation (table 4). We suspect that this lack of familiarity is due to an unclear description of the innovation category in the survey rather than actual unfamiliarity. Nearly 77 percent of participants use visitor information. The primary reason participants use visitor information is to improve the quality of recreation opportunities provided to visitors and to provide support for management actions (table 5). Of the participants not using visitor information, half cite insufficient funding as the main cause. Like ROS and LAC, information on visitor attitudes, preferences, and behavior is conveyed through training sessions for most participants. Other outlets, such as literature and school, are also important diffusion points.

DISCUSSION

Recreation resource management research devotes funds and other resources to the development of innovations. Yet little work has been done to determine the importance of the innovations, let alone their relative importance in meeting management goals or their diffusion and implementation patterns. Our study sought to fill the information void.

More than a decade after Moeller and Heytze (1981) identified a long innovation diffusion process in the Forest Service, snags in the communication process seem to still exist. Although participants articulated more than 20 innovation categories, few of these innovations have been widely implemented. Even for innovations identified as most important and widely used, such as the ROS or LAC, implementation barriers still exist. A process for diffusion adoption and implementation should be developed to complement the research-derived innovations. The process could consist of an innovation review with involvement at all levels, from developers to potential users. Such involvement is supported by Moeller and Schaffer (1981) and Driver and Koch (1981).

Table 3.—Innovations ranked by relative importance in meeting three recreation management objectives

Innovation category	Recreation management goal					
	Improving quality of recreation experiences		Increasing efficiency of providing recreation opportunities		Decreasing environmental impacts	
	Managers rank (n=111)	Researchers rank (n=20)	Managers rank (n=111)	Researchers rank (n=20)	Managers rank (n=111)	Researchers rank (n=20)
Techniques to promote better visitor information and education	7	3	6	1	5	4
Techniques to measure visitor behavior, attitudes and perceptions	1	2	1	3	6	6
Methods to involve the public in resource decisions	2	1	4	6	4	8
Techniques to manage visual resources (e.g. VMS)	3	7	7	10	10	10
Methods to manage for diversity (e.g. ROS)	5	4	5	2	8	7
Techniques to monitor social and physical resource conditions	4	6	2.5	8	2	3
Methods to decrease resource degradation (e.g. site hardening)	8	9	10	9	1	1
Ways to determine limits of acceptable change (e.g. LAC)	6	8	8	7	3	2
Computer techniques for visitor management (e.g. MISTIX, PARVS)	9	10	2.5	5	9	9
Techniques to manage visitors directly and indirectly (fees, permits, etc.)	10	5	9	4	7	5

Table 4.—*Percent of respondents using an innovation and familiar with an innovation (n=114)*

Innovation	Percent of respondents using innovation	Percent of respondents familiar with innovation
Recreation opportunity spectrum	87.7	100
Limits of acceptable change	69.6	100
Information on visitor attitudes, perceptions, and behaviors	76.8	89.3

Table 5.—*Reasons for innovation implementation and failure to implement, and diffusion points by innovation category*

(In Percent)

	Innovation category		
	Managing for diversity	Limits of acceptable change	Visitor attitudes, preferences and behavior
Reasons innovation was implemented			
Provide support for management actions	84.3	68.8	75.0
Improve quality of recreation opportunities	65.7	69.9	90.9
Increase the number of recreation opportunities	34.3	8.6	47.7
Decrease environmental impacts	25.0	63.4	2.7
Increase confidence as a manager	23.1	31.2	37.5
Lower cost of providing recreation opportunities	5.6	3.2	36.4
Other (meet visitor needs, improve planning)	22.2	18.3	12.5
Reasons innovation was not implemented			
Lack trained staff	33.3	40.0	
Irrelevant to current duties	16.7	20.0	25.0
Public demand changed	16.7		
Better alternative replaced tool		20.0	
Inappropriate to current duties	8.3		
Lack sufficient funding	8.3	20.0	50.0
Other	16.7		25.0
Innovation diffusion points			
Training session	57.3	43.7	31.5
Other manager	9.1	12.6	9.8
Conference	5.5	15.5	15.2
Supervisor	3.6	1.9	1.1
Journal	2.7	17.5	9.8
University extension service	0.9		3.3
Other (literature, school)	20.9	8.7	29.3

Also, the plan could target the most effective diffusion points, such as training sessions, and develop them. Such a process or implementation plan provides a systematic pattern to follow for developing and adopting innovations.

Our results suggest the knowledge gap identified by Goss (1979) still exists. Researchers are producing and disseminating innovation information but generally are not reaching the potential audience. Training sessions, most relied on by recreation managers for information on innovations, are serving as information sources, but the quality of information presented is questionable because the main deterrent to innovation implementation is a lack of trained staff. Anderson and Morck (1986) found researchers' communications are ineffective for some managers. Researchers and managers need to gather and address this lack of communication.

The variety of reasons listed for innovation implementation indicates managers are flexible in their application of innovations. Further, rather than dictating a specific implementation format, some innovations, such as the ROS and LAC, specify modifications that may be necessary to meet specific goals. Thus, both researchers and managers seem flexible about innovation implementation decisions. This flexibility could contribute to a more cooperative approach to innovation design and diffusion. Among our participants, the pro-innovation bias does not seem to exist. Pro-innovation bias, which asserts that innovations should be diffused and adopted by all members of a system with little if any re-invention or rejection, results from criticism in the 1970's of diffusion theory (Larsen 1980).

The evolution of innovations in recreation management suggests they may be candidates for the innovation decision design presented by Downs and Mohr (1976). Traditional diffusion theory depends on the innovation being a definable and constant unit (Rogers 1983). Because recreation innovations undergo many changes, a more flexible innovation decision design seems appropriate. Investigating further recreation resource management innovations may lead to a more complete and thorough understanding of innovation in public resource management agencies.

Our research expands current innovation literature in three ways. First, we identified important innovations in recreation resource management. Knowing what innovations are considered important sheds light onto the success and failure of innovations. Those innovations deemed successful can be evaluated, and characteristics of the diffusion plan can be adopted with other innovations. Second, our results reveal distinct differences between the importance of innovations in meeting specific management goals. Thus, an innovation may be important for one management goal, but unnecessary for another. Such differentiation is important for targeting appropriate adopters. Third, reasons for and deterrents to innovation implementation were identified. Insight into why managers implement innovations may aid in improving the adoption process. Also, barriers to implementation can be evaluated and solutions can be found to overcome them.

Although this study focused on Forest Service personnel, the results have implications for natural resource agencies in general. We recommend including managers throughout the innovation development process. Manager input may promote the adoption and acceptance of the innovation and may improve the quality of the innovation for use.

Our findings also suggest a need to review and revitalize training sessions. Proven to be an important diffusion point for recreation resource management innovations, training sessions need to be of top quality. The amount, type, and presentation of information may be critical in diffusing innovations and producing an up-to-date trained staff.

We would suggest revitalizing the defunct Office of Technology Transfer in the Forest Service and creating similar offices in other agencies. A technology transfer center could provide training, support, and encouragement for innovation adoption. Such a center could also evaluate present and past innovations and methods of innovation dissemination.

Finally, Jakes (1992) has pointed out that many of our past evaluations of research benefits have been limited to economic benefits, and that it is time for research evaluation to

move beyond economic efficiency to evaluate other research benefits. Our study has demonstrated that for some important innovations, economic efficiency has little to do with whether or not an innovation is adopted. Rather, other benefits, such as providing support for management actions or improving the quality of an experience, are perceived as more important by the people who actually use the innovation. To measure the total benefits of natural resource research, all the impacts from an innovation, both economic and non-economic, must be accounted for.

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Uses a Delphi technique to (1) identify important innovations in recreation resource management, (2) determine their relative importance in meeting recreation management objectives, (3) and gather information about their diffusion and implementation.

KEY WORDS: Research evaluation, Delphi, technology adoption, recreation research

Our job at the North Central Forest Experiment Station is discovering and creating new knowledge and technology in the field of natural resources and conveying this information to the people who can use it. As a new generation of forests emerges in our region, managers are confronted with two unique challenges: (1) Dealing with the great diversity in composition, quality, and ownership of the forests, and (2) Reconciling the conflicting demands of the people who use them. Helping the forest manager meet these challenges while protecting the environment is what research at North Central is all about.

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